~~SDH~~
~~A5A123~~
#1

Comp. files

RECEIVED
UPPER DARBY, PA

STN PUB
NRM
M.P.
No. 1

The NORTHERN GREAT PLAINS RESEARCH CENTER

Its work and aims..

JUL 5 1983

ROCKY MOUNTAIN STATION

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
1950

CONTENTS

Page

COVER PHOTOGRAPH - Studying the recovery of native range vegetation following the 1934-1936 drought

LOCATION..... 1

DESCRIPTION OF AREA..... 1

HISTORY OF RANGE RESEARCH IN THE AREA..... 2

HISTORY OF THE U. S. RANGE LIVESTOCK EXPERIMENT STATION..... 3

CATTLE RANGE STUDIES
- How conducted..... 4
- Results..... 5

SHEEP RANGE STUDIES
- How conducted..... 7
- Results..... 7

ARTIFICIAL REVEGETATION STUDIES
- How conducted..... 8
- Results..... 8

A LOOK AHEAD..... 9

AFFILIATION

THE NORTHERN GREAT PLAINS RESEARCH CENTER IS A GEOGRAPHICAL WORK UNIT OF THE NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION LOCATED AT MISSOULA, MONTANA.

RANGE STUDIES IN THE CENTER ARE CONDUCTED IN COOPERATION WITH THE BUREAU OF ANIMAL INDUSTRY, THE MONTANA AGRICULTURAL EXPERIMENT STATION, AND PRIVATE OPERATORS.

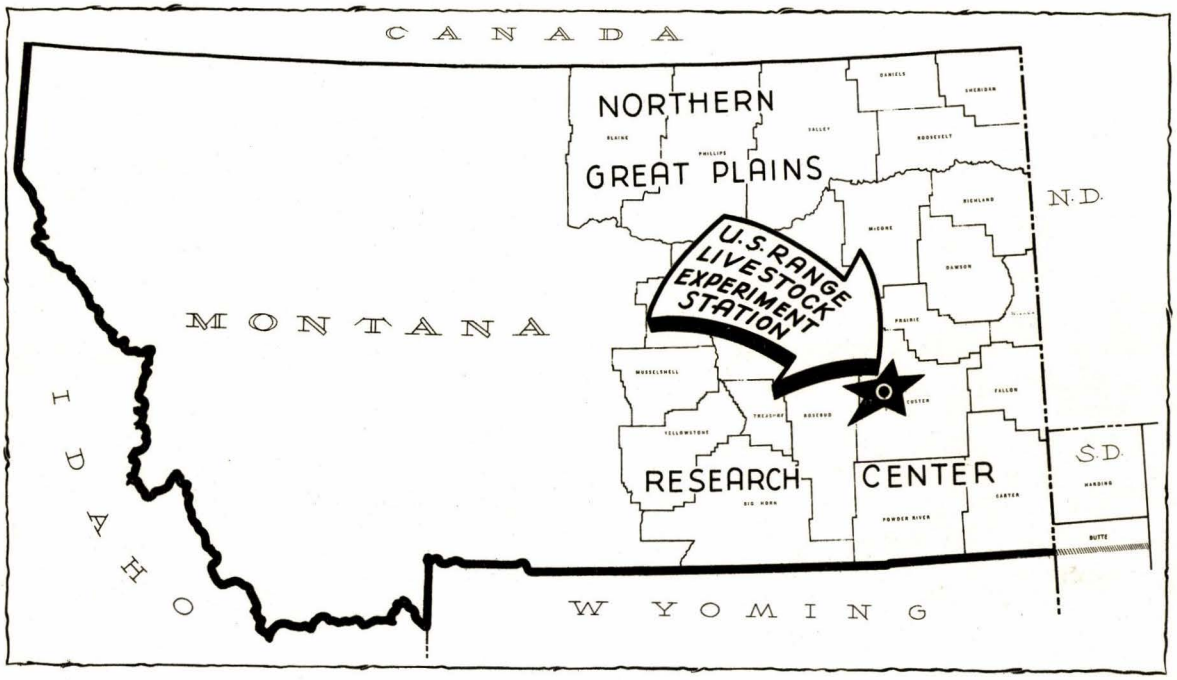
NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Miscellaneous Publication No. 1 May 1950

Agriculture—Missoula

LOCATION

THE NORTHERN GREAT PLAINS RESEARCH CENTER extends south from the international boundary to Wyoming and west from the Dakotas to a line which crosses Montana west of Billings and east of Havre. The work area includes over 40 million acres in 22 eastern Montana counties.



HEADQUARTERS are at the U. S. Range Livestock Experiment Station, 2.5 miles west of Miles City, Montana.

DESCRIPTION OF THE AREA

CLIMATE is typically continental with relatively warm summers and cold winters. Average annual precipitation is 13.2 inches at Miles City, near the geographical center of the area, and ranges from about 11 inches in the driest parts to 18 inches near the mountains. More than 70 percent of the precipitation comes during the six-month period starting April 1. On the average, severe drought occurs about once in seven years.

RANGE VEGETATION is largely of the mixed-prairie (shortgrass) type, the principal species of which are bluestem wheatgrass, blue grama, needle-andthread, green needlegrass, Sandberg bluegrass, threadleaf sedge, big, silver, and fringed sagebrush, saltbush, and greasewood. Buffalograss is quite common south of the Yellowstone river. Other associations, more limited in extent, but locally important, include the sagebrush-grass and the open forest-bunchgrass range types.

THE NATIVE MIXTURES of cool and warm weather grasses give the northern plains a reputation for high quality forage. Cheatgrass and other low-quality grasses and weeds are uncommon except on abandoned plowed lands.

SOILS developed under the semiarid climate and rather sparse northern prairie vegetation are commonly shallow and light-colored, but rich in plant foods. With adequate moisture, they produce highly nutritious grass.

MAJOR DRAINAGES are the Missouri and Yellowstone rivers. Important tributaries include the Milk, Musselshell, Big Horn, Little Horn, Rosebud, Tongue, Powder, and Little Missouri rivers. Most of the water entering the main drainages is runoff from range lands following heavy, often localized, downpours. Maximum loads of silt and debris are often carried, particularly from the fantastically eroded badlands.

LAND OWNERSHIP is 65 percent private. The remainder is largely in Federal or State custody. Public landholders, in addition to the State, include the Bureau of Land Management, Indian Service, Forest Service, Soil Conservation Service, and Fish and Wildlife Service.

CHIEF LAND USE is grazing by domestic livestock, nearly 87 percent of the land area being used for this purpose. Forty-three percent of Montana's cattle, 48 percent of her sheep, and 46 percent of her horses are found within the boundaries of the Research Center. All depend upon range land for part of their sustenance annually. Wheat, other small grains, alfalfa, sugar beets, and wild hay are the principal agricultural farm crops.

HISTORY OF RANGE RESEARCH IN THE AREA

THE FOREST SERVICE was authorized by Congress to conduct range research on both public and private lands in 1915. But it was not until 1931 that a range research division of the Northern Rocky Mountain Experiment Station was established to serve Montana. The following year, range studies were undertaken on a cooperative basis with the Bureau of Animal Industry and the Montana Agricultural Experiment Station at the U. S. Range Livestock Experiment Station.

SINCE THAT TIME additional studies, mostly on reseeding, have been carried on with private cooperators at many other locations in eastern Montana. However, a majority of the range research done in the area embraced by the Research Center has been conducted at the Range Livestock Experiment Station.

ESTABLISHMENT of the Northern Great Plains Research Center was recently approved by Congress, but appropriations to date have been insufficient to carry one technician full time. The Range Livestock Experiment Station continues to be the focal point for range research in the Center. Most of the results herein reported are from studies on the Station.

HISTORY OF THE U. S. RANGE LIVESTOCK EXPERIMENT STATION

THE RANGE LIVESTOCK EXPERIMENT STATION occupies the site of old Fort Keogh, by whose side Miles City, one of the earliest settlements in eastern Montana, developed. The Fort, established in 1876 near the junction of the Tongue and Yellowstone rivers followed shortly the massacre of General Custer and his seventh cavalry by the Sioux in the battle of the Little Big Horn. The original buildings constructed of cottonwood logs from along the rivers stood near the present site of the Range Riders' Museum. In 1877, buildings were constructed on the present site, part of the brick and building material being shipped from St. Louis by wood-burning river boats at high-water time in the spring. Some of the buildings constructed as officers' quarters in 1877 and 1878 still serve as residences on the Station.

THE FIRST LIVESTOCK in the vicinity consisted of a band of sheep, trailed from California, which arrived at Miles City in the late fall of 1877 en route to the Black Hills. The band was wintered near Miles City upon the advice of Colonel Miles who pointed out the dangers of hostile Indians and the oncoming winter. The following spring the sheep were sold to a partner of Colonel Miles who became the first stockman in this vicinity.

CATTLE appeared on the scene shortly thereafter. Large numbers were brought to the northern plains in the following years, many being trailed north from Texas.

FORT KEOGH was maintained as a military base until 1901 when the army converted the Fort into a remount station and operated it as such until 1923.

THE RANGE LIVESTOCK EXPERIMENT STATION came into being in 1924, when by congressional action the military reservation was made available to the United States Department of Agriculture as a livestock experiment station. Originally 10 miles square, the area since has been reduced to about 56,000 acres.

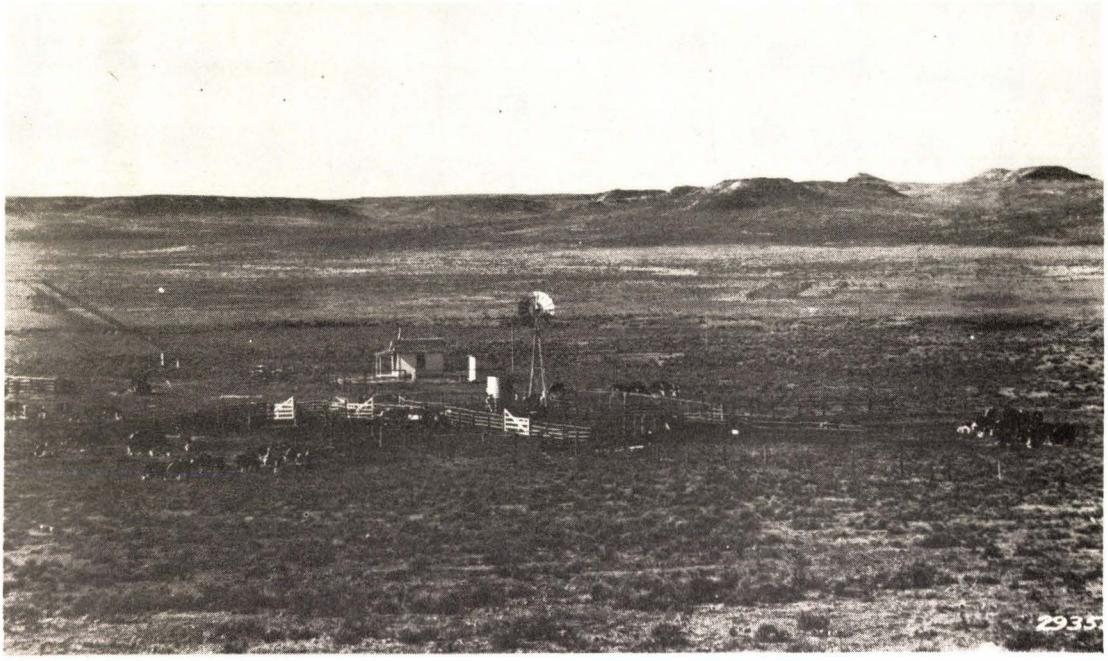
ADMINISTRATION of the Station is by the Bureau of Animal Industry which in conjunction with Montana Agricultural Experiment Station has conducted research in livestock breeding and management of wide recognition. Their program, at present, is limited to beef cattle and swine, although previously it included sheep, horses, and turkeys. Results of this work may be obtained from the Superintendent of the Station.

RANGE STUDIES on the Station have been carried out by the Forest Service in cooperation with the above agencies.

CATTLE RANGE STUDIES

How conducted

HEREFORD BREEDING COWS were stocked yearlong at light, moderate, and heavy rates on 12 native range pastures from 1932 through 1945. Six of the 12 pastures provided range from mid-May through mid-November, the other 6, the remaining months; and two pastures of each group were stocked at each of the three intensities.



Central well on experimental summer cattle range where breeding cows from two lightly, two moderately, and two heavily stocked pastures watered.

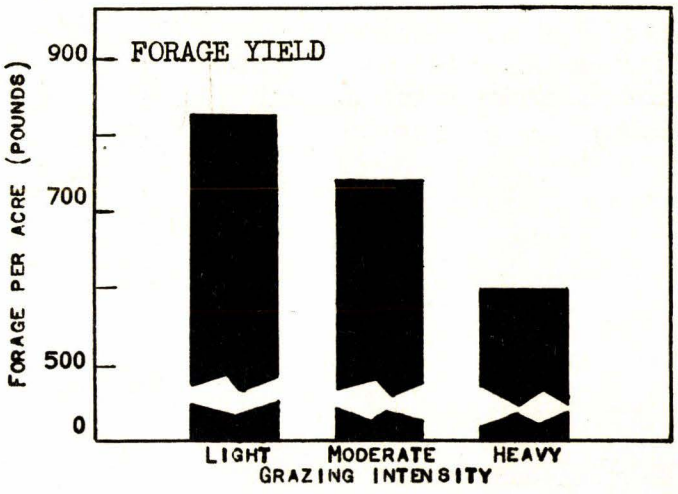
SURFACE ACRE ALLOWANCE per cow on a yearlong basis for the three rates of stocking was 38.8 for light, 30.5 for moderate, and 23.1 for heavy.

TWO GROUPS OF COWS were used during the study: the first group being sold in 1936 because of drought and the second group started the following summer and retained through 1945. Animals were managed under range conditions and individual lots kept at constant rates of stocking.

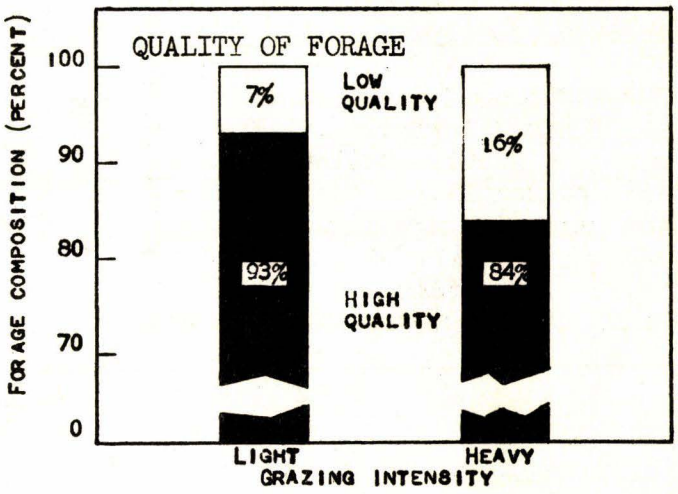
Results

AFTER 14 YEARS' STOCKING (1932-1945), some of the range and cattle results were as follows: (Over-all results are at present being prepared for publication.)

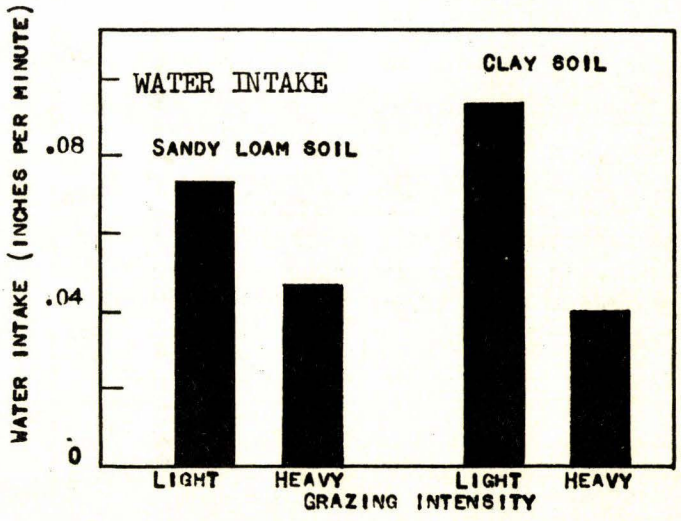
Total annual forage production was greater on lightly and moderately grazed summer ranges than on those grazed heavily.



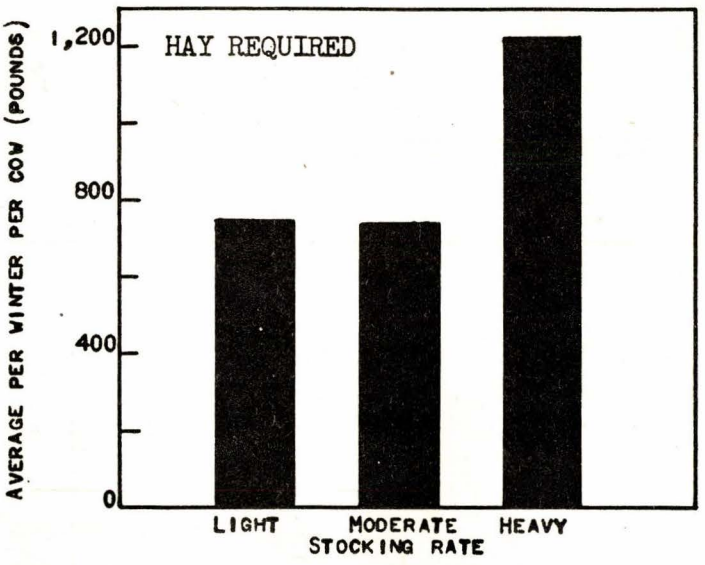
Quality of forage was maintained at a high level on summer ranges by light grazing.



Water intake by range soils was more rapid on lightly than on heavily grazed summer ranges.

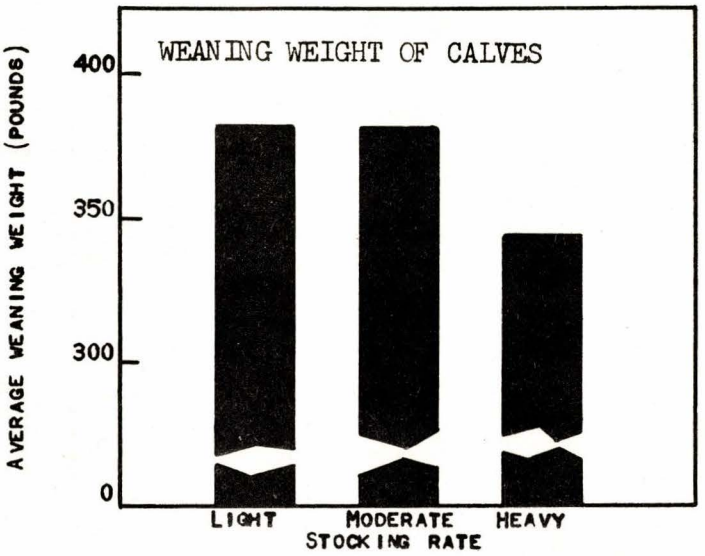


Less hay was required to winter the cows under light and moderate stocking than under the heavy rate.

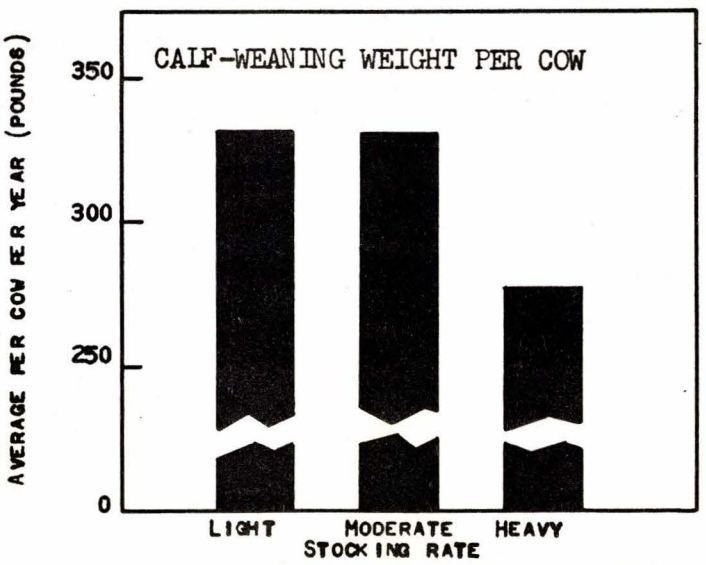


Calves weaned heavier from cows stocked lightly and moderately than from those stocked heavily.

For additional information see Montana Agricultural Experiment Station Bulletin No. 463, August 1949: "Weight and gain of range calves as affected by rate of stocking" by E. J. Woolfolk and Bradford Knapp, Jr.



Production of calf-weaning weight per cow was greater under light and moderate stocking than under the heavy rate.



SHEEP RANGE STUDIES

How conducted

GUIDES TO PROPER STOCKING of northern plains sheep ranges were obtained by stocking three range pastures with dry yearling Rambouillet ewes each year from 1936 through 1941 for about an 8-month period starting in mid-March. Pasture stocking rates averaged 0.53, 0.94, and 1.35 sheep-months per acre which were called heavy, moderate, and light, respectively.

Results

SIX YEARS OF SHEEP GRAZING in these pastures indicated that:

A minimum of 0.67 surface acre of range per month or 5.4 acres for an 8-month season should be provided for normal development and maintenance of a dry yearling ewe.

This rate of stocking will maintain the range vegetation in good condition and provide a desirable carry-over of unused forage at the end of each grazing season.

Too heavy grazing and trampling by sheep will deteriorate the range from perennial grasses to a weed cover of little forage value.

Further details are included in U. S. Department of Agriculture circular No. 804, April 1949: "Stocking northern Great Plains sheep range for sustained high production" by E. J. Woolfolk.

Six years of heavy sheep grazing changed the composition of typical northern plains range to a dense stand of low-value annual weeds, mostly woolly Indianwheat, except in the protection of pricklypear cactus.

ARTIFICIAL REVEGETATION STUDIES

How conducted

SPECIES ADAPTATION TRIALS were conducted on the Range Livestock Experiment Station and on many ranches and farms throughout the area, under a variety of conditions, as a basis for selecting the most promising forage species for regrassing abandoned plowed and otherwise deteriorated range lands.

METHODS OF PLANTING, including time, depth, rate, method, and soil preparation were studied under a number of conditions for selected species.

GRAZING TRIALS were conducted with one outstanding introduced grass, crested wheatgrass, to determine its place in the production of range livestock.

Results

Crested wheatgrass was found to be the outstanding species for restoring formerly plowed rangelands to a high state of production, particularly on dry sites.

> Late fall is the best time to sow crested wheatgrass under most eastern Montana conditions.
>
> Seedbed preparation is unnecessary with this cool-weather grass if seeded soon after land is retired from cultivation or if only warm-weather weeds, like Russian thistle, are present.
>
> An ordinary grain drill is entirely satisfactory for sowing and is recommended over broadcasting.
>
> Three-quarter of an inch is the recommended depth of planting.

For further details, refer to U. S. Department of Agriculture Farmers' Bulletin No. 1924, February 1943: "Reseeding to increase the yield of Montana rangelands" by L. R. Short.

Formerly plowed range restored to high grazing capacity by reseeding to crested wheatgrass.

Crested wheatgrass pasture has a high carrying capacity, begins growth early, and produces rapid gains while green.

During an 11-year period, 46-acres of crested wheatgrass on the Station produced over 40,000 pounds of beef. The grazing season averaged 117 days per year, starting about mid-April; and grazing use amounted to approximately 1,400 animal-unit days per year or 1 animal-month per acre per year. Assuming that 20 pounds of air-dry material are necessary daily for animal maintenance, an average of 14 tons of herbage or 0.3 tons per acre was harvested from this 46-acre pasture annually. This greatly exceeds production to be expected on nearby good native range.

A LOOK AHEAD

The foregoing are only some of the results obtained from range research conducted in the Center since 1932. During this period considerable has been learned about the utilization and maintenance of native range and the establishment and grazing value of reseeded stands, but much of such information which is basic to maximum sustained livestock production and adequate watershed management on eastern Montana ranges remains to be

known. With this in mind, present plans are to continue the cattle grazing study to further investigate the responses of range plants and soils to the three intensities of stocking and to determine their effects on successive generations of grazing animals. Toward this end, stocking of the experimental range pastures has been continued at the established relative rates since 1945. The pastures now are stocked with the base herds to be used in the generation study.

Further plans are to undertake studies on the rate of recovery of native range deteriorated through too heavy grazing and to continue studies to discover or develop improved forage grasses that can be established on the range to extend the green forage period into mid-summer and improve the grazing capacity of native ranges.

Satisfactory conclusion of these major phases, it is anticipated, will require a minimum of 20 years.

PARTIAL LIST OF PUBLICATIONS

*Reseeding to increase the yield of Montana range lands, by L. R. Short. USDA Farmers' Bulletin No. 1924. February 1943.

*Salt-bonemeal mixture used by breeding cows on short-grass ranges during four summer and three winter seasons, by E. J. Woolfolk. Northern Rocky Mountain Forest and Range Experiment Station Research Note No. 32, February 1944.

Controlling the pricklypear, by C. E. Holscher, Western Livestock Journal, June 15, 1944.

Important range plants of eastern Montana, by E. J. Woolfolk. Series of 7 articles. The Montana Stockgrower, monthly, November 1944 through March 1945; May, June 1945.

Crested wheatgrass gives good returns under heavy grazing, by E. J. Woolfolk. The Montana Farmer, April 15, 1945.

The effects of clipping bluestem wheatgrass and blue grama at different heights and different frequencies, by C. E. Holscher. Ecology, Vol. 26, No. 2, April 1945.

Penalties of heavy range use, by L. C. Hurtt. American Hereford Journal, July 1, 1946.

*Stocking northern Great Plains sheep range for sustained high production, by E. J. Woolfolk. USDA Circular No. 804, April 1949.

*Weight and gain of range calves as affected by rate of stocking, by E. J. Woolfolk and Bradford Knapp, Jr. Montana State College Agricultural Experiment Station Bulletin No. 463, August 1949.

In Preparation

Managing northern Great Plains cattle ranges to minimize effects of drought, by L. C. Hurtt.

Conservative forage utilization - a key to efficient cattle production, by C. E. Holscher, L. C. Hurtt, and E. J. Woolfolk.

Response of vegetation, soil, and cattle on northern Great Plains range to three rates of stocking, by M. J. Reed and R. A. Peterson.

*Copies available upon request at the U. S. Range Livestock Experiment Station, Miles City, Montana, or Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana. Copies of articles without asterisk no longer available.